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First steps into the operation of the SAPOTI cryogenic nanoprobe at the CARNAÚBA beamline at Sirius/LNLS

Tuesday 16 September 2025 16:00 (20 minutes)

SAPOTI is the second nanoprobe at the CARNAÚBA (Coherent X-Ray Nanoprobe Beamline) beamline at the 4th-generation light source Sirius/LNLS. Working from 2.05 to 15 keV, it relies on simultaneous multi-analytical X-ray techniques (absorption, diffraction, spectroscopy, fluorescence and luminescence) and imaging in 2D and 3D. It has been designed for highly-stable fully-coherent beam sizes from 30 to 120 nm, and monochromatic flux up to $1e11\text{ph/s/100-mA/0.01\%BW}$ after an achromatic KB (Kirkpatrick-Baez) focusing optics*. Moreover, a new in-vacuum high-performance cryogenic sample stage has been developed aiming at single-nanometer resolution images. The nanoprobe is now successfully installed and technical commissioning is underway**. The focus of this work is two-fold. Firstly, it highlights the system integration results at the beamline, namely: overall thermo-mechanical performance of the loading module, KB mirrors and sample stage; and nanopositioning scanning capabilities. And, finally, it showcases the instrument's technical commissioning results, namely: KB alignment and focus stability, and initial fly-scan potential for ptychography and absorption imaging.

Footnotes

* Tolentino, H.C.N., et al. "CARNAUBA: The coherent X-ray nanoprobe for the Brazilian Synchrotron Sirius/LNLS", J. Phys.: Conf. Ser. 2017; 849 (1): 012057.

** Geraldès, R.R., et al., "Commissioning Results of the SAPOTI Cryogenic Nanoprobe at the CARNAUBA Beamline at Sirius/LNLS", Proc. SRI2024, 2025.

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